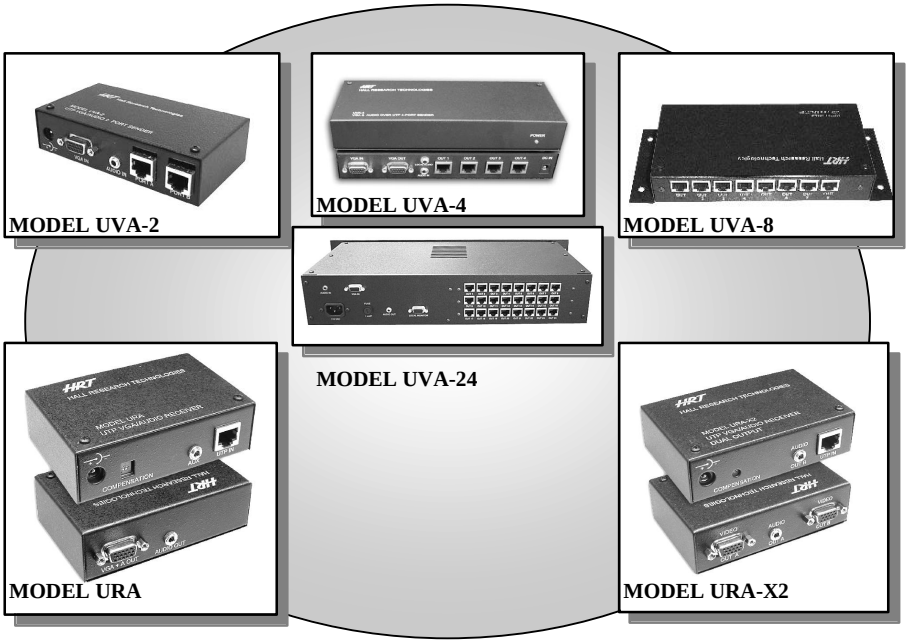
**Hall Research Technologies, Inc.**

# VGA and Audio Splitters and Receivers for transmission on Twisted Pair Cable ( Cat5/5e/6 or Zero-Skew UTP )




| | | |
|---|---|---|
| **MODEL** | **UVA-2** | **UTP VGA/AUDIO 2-PORT SENDER** |
| **MODEL** | **UVA-4** | **UTP VGA/AUDIO 4-PORT SENDER** |
| **MODEL** | **UVA-8** | **UTP VGA/AUDIO 8-PORT SENDER** |
| **MODEL** | **UVA-24** | **UTP VGA/AUDIO 24-PORT SENDER** |
| **MODEL** | **URA** | **UTP VGA/AUDIO RECEIVER (Standard)** |
| **MODEL** | **URA-X2** | **UTP RECEIVER with 2 VGA & 2 AUDIO OUTPUTS** |
| **MODEL** | **URA-VOL** | **UTP RECEIVER with VOLUME CONTROL & AMPLIFIED AUDIO OUTPUT** |

January 3. 2006


**CUSTOMER SUPPORT INFORMATION**

Order **toll-free** in the U.S. **800-959-6439**
FREE technical support, Call **714-641-6607** or fax **714-641-6698**
Mail order: **Hall Research Technologies**, 1163 Warner Ave, Tustin, CA 92780
Web site: **www.hallresearch.com** • E-mail: **info@ hallresearch.com**

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## EUROPEAN UNION DECLARATION OF CONFORMITY

This product has been tested and shown to comply with the requirements of the European EMC directive 89/336/EEC

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# 1. Introduction

## 1.1 General

This User's Manual covers both the splitters (senders) and the Remote Receivers. The splitters can be any of the following models: UVA-2, UVA-4, UVA-8, or UVA-24. For these units, the number after the dash represents the quantity of RJ45 outputs.

The basic receiver unit which works with any of the splitters is Model URA. There also some variations of the basic receiver such as one that has 2 sets of Video and audio outputs (Model URA-X2), or one with powered audio output and volume control (URA-VOL).

The splitters (senders) convert a PC's VGA and audio signals into a format that can be transmitted using a single inexpensive and commonly available Unshielded Twisted Pair (UTP) cable with RJ45 connectors. Both UTP and STP (shielded) cables can be used. In addition you can use Cat5, 5e, 6, or higher. However, for runs of over 250 feet, HRT recommends using "Skew-free" or "Zero-skew" Cat5 cables for best performance. The senders also have local buffered loop-thru outputs for the VGA and audio for connection to local monitor or expansion.

At the receiving (remote) end, a receiver Model URA (sold separately) is used to convert the UTP signal back to VGA and audio.

These products are housed in compact shielded enclosures and include connectors for a local monitor and speakers as well as multiple RJ45 connectors for connection to remote monitors.

Included with the devices are: a small power supply. The senders also come with short video and audio cables for connection to the PC's VGA and sound card's outputs.

The RJ45 outputs on the Splitters can drive CAT5 LAN cables to 1000 feet (305 meters) with little to no degradation of video quality depending on resolution of the VGA signal (see table 3.2). The receiver can compensate for signal losses in long cable runs.

## 1.2 Features

- Support for local monitor and speaker at sending end
- Handles resolutions up to 1600x1280 at any refresh rate
- Rugged, Reliable, Compact size
- No software required
- Drive standard CAT5 cables to 1000 feet
- Transmit audio and video signals on one cable
- Easily expand Splitters by daisy-chaining the local in/out ports
- Adjustable cable length compensation at each URA receiver

# 2. Installation

1. Connect the VGA IN and AUDIO IN connectors of the UVA-x to the computer's video and speaker ports using the supplied cables (see figures 2.1 and 2.2).

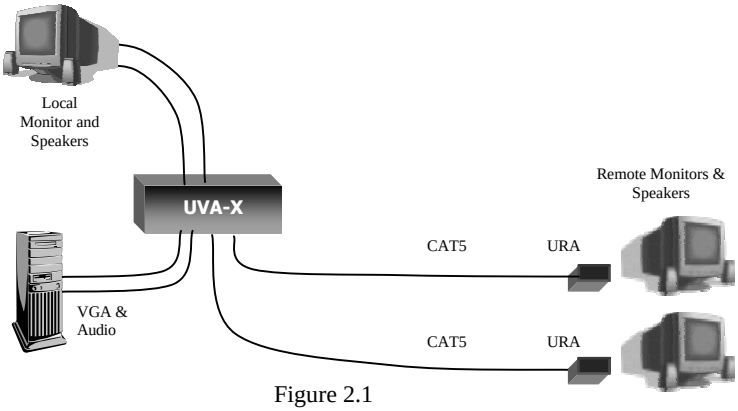



Figure 2.1

Figure 2.2

Figure 2.3

2. Connect the local monitor and speakers to the device's VGA OUT and AUDIO OUT connectors respectively. (see Figure 2.3)

## NOTE

**To expand the number of outputs, use these ports to daisy chain to another UVA-x's VGA and audio inputs. Connect the local monitor and speakers to the last unit in the chain.**

3. Connect the included power supply to the power input connector on the unit.
4. Using Category-5 or higher UTP cable connect one or more URA receivers to the sender's RJ45 outputs.
5. Connect the remote monitor and speakers to the receiver unit and attach the power supply to the receiver

Figure 2.4

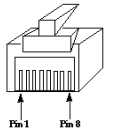
## CAUTION

**Before plugging in the remote monitor, verify that the AC line is properly wired and that a protective ground (green) wire is established with NO potential difference between both the sender and receiver locations. The splitter can tolerate up to 5 v peak-to-peak ground potential between the two locations. Failure to ensure good grounding can result in erratic operation and possible shock hazards or damage to your equipment.**

## NOTICE

**Do not connect this unit to any LAN device such as network cards or hubs as this may damage the UVA/URA and/or the LAN device. Use EIA/TIA 568B standard straight-through patch wiring as shown below. Do not use crossover cables.**

| EIA/TIA 568B WIRING STANDARD | |
|---|---|
| PIN | Wire Color |
| 1 | White w/ Orange Stripe |
| 2 | Orange |
| 3 | White w/Green Stripe |
| 4 | Blue |
| 5 | White w/Blue Stripe |
| 6 | Green |
| 7 | White w/Brown Stripe |
| 8 | Brown |




# 3. Configuration & Operation

## 3.1 Sender

At the sending end the video signal from the PC is fully terminated and buffered for the local video output connector. This means that terminating or plugging a local monitor is not necessary and this connector can be left open.

If a local monitor is plugged in, the plug-and-play ID information (DDC) of the monitor is passed to the PC.

The stereo audio input is passed through to the local audio output connector and the audio integrity is fully preserved. The transmitted audio in the CAT5 cable to the remote receiver is monaural. The audio output on the standard receiver is “line-level” (powered speakers are required). The Model URA-VOL provides amplified audio output in addition to the line-level output for driving passive speakers directly.

## 3.2 Receiver

Several receiver types are available (URA-x). All Receivers have a single COMPENSATION potentiometer (pot) adjustment to recover high frequency signal loss for long runs of the cable.

The Model URA-X2 has 2 identical VGA outputs and 2 Audio outputs. It acts as if a standard URA was followed by a video and audio splitter.

The URA-VOL provides volume level adjustment (section 3.2.1).

### 3.2.1 Adjusting the video quality for long cable runs

Please refer to Figure 2.4 for the location of the compensation pot. Turning the pot CW increases the compensation. Use a small screwdriver and starting from CCW slowly turn the pot CW until the image is perfectly clear. Fully CCW corresponds to no compensation (recommended for lengths of 100 ft or less), and fully CW corresponds to 1000 feet. Be careful not to over-compensate the video image.

The video quality at the remote station depends on: (1) the length of the CAT5 cable, (2) video resolution setting, and (3) refresh rate setting.

In general, at low and mid resolutions, excellent image reproduction is provided at up to 1000 feet. At high resolution and refresh rates perfect image reproduction can be achieved at shorter distances (see table 3.1 below). Using longer cables or higher resolution rates will still produce an image, but the reproduction quality will be reduced.

| | | Refresh Rate | | |
|---|---|---|---|---|
| | | 60 Hz | 75 Hz | 85 Hz |
| Resolution | 800x600 | 1000 ft | 1000 ft | 1000 ft |
| | 1024x768 | 1000 ft | 800 ft | 750 ft |
| | 1280x1024 | 750 ft | 650 ft | 600 ft |
| | 1600x1200 | 650 ft | 600 ft | 500 ft |

Table 3.1

Maximum Recommended Cable Lengths

## 3.2.2 UTP Cable Recommendations

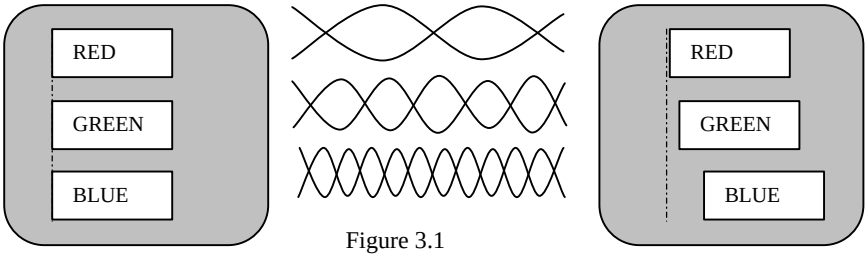



Figure 3.1

UTP cables have 4 twisted pairs inside. The UVA/URA video transmission on UTP, uses 3 individual pairs for each color (Red, Green, & Blue). As shown in figure 3.1 above, a characteristic of Category-5/5e/6 cable is that the pairs of wires are twisted at different rates. Therefore, for a given length of Cat-5 cable the total length of a particular pair could be longer than others. Since the signals travel in the cable at a fixed speed, the arrival times of signals can be skewed in a long cable (those that have to travel farther arrive later and the corresponding color shifts to the right).

This is seen on the monitor as separation, or lack of convergence in colors. For example a vertical white line on the screen may look to have a red tinge on the left edge and blue tinge on the right edge.

This effect gets worse at high resolutions, high refresh rates, long cables (in excess of 200 feet), and depends on the cable construction itself. Hall Research highly recommends the use of UTP cables specifically constructed for video transmission. In these cables the all the twisted pairs are the same length. They are available from several sources including Hall Research (part numbers shown below).

**Zero-Skew CAT5 Cable for use with Hall Research CAT5 Products**

| PART NUMBER |
|---|
| **CUTP-Z-1000-BLK 1000 ft.**<br>Zero-Skew CAT5 cable. Bulk spool of 1000 ft |
| **CUTP-ZP-1000-BLK 1000 ft.**<br>Zero-Skew CAT5 cable. Bulk spool of 1000 ft **Plenum Rated** |

If you are going to use commercial grade UTP cable, then we recommend using Cat5 or Cat5e rather than Cat6, since the twist ratio match is better in Cat5 cable.

### 3.2.3 Volume Control (applies to Model URA-VOL only)

On this receiver 2 audio outputs are available, "AUDIO OUT " (line level) and "AUX" (amplified)

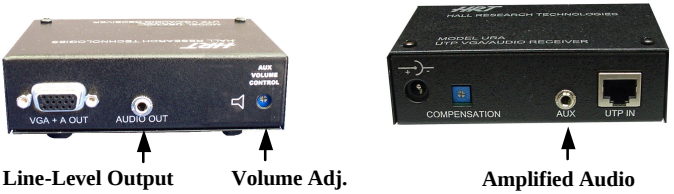



Figure 3.2 – Front and rear panels of URA-VOL

When using the "AUX" (amplified) audio output you can adjust the volume using the recessed volume control pot. A small flat blade screwdriver will be required to make the adjustment.

### 3.2.4 The Model URA-X2

This receiver is identical to the standard URA with the exception that it has 2 VGA outputs and 2 audio outputs. Both outputs show the identical image.

Figure 3.3 –Front & rear of URA-X2

# 4. Troubleshooting

## 4.1 Problem Solving FAQ

**1. Fuzzy, blurry, or ghosting image at remote location**

If you have a stable image but it looks somewhat blurry (edges are not sharp), make sure that you have adjusted the receiver unit's compensation pot correctly. Also check table 3.1 to see that you have

not exceeded the maximum recommended cable length. If you still have a fuzzy image, try reducing the refresh rate and/or resolution of the PC.

You can point your browser to www.hallresearch.com/skew.htm for an image that allows you to adjust the compensation and also evaluate the amount of color skew in your setup. If you determine that you have excessive color skew, then you must either consider using Zero-Skew UTP cable, or if that is not possible, use a secondary device whose job is to correct the color skew (please contact HRT for details).

Your splitter has multiple RJ45 output connectors. When a long CAT5 cable is plugged in any of the outputs, the unit expects a receiver unit at the far end for proper termination. Therefore unplug the un-terminated CAT5 cables from the splitter unit.

**2. Image exhibits steady or rolling horizontal color "hum" bars**
This is usually an indication of improper grounding either at the sending end, the receiving end, or both. Verify that the AC line is properly wired and that a protective ground (green) wire is established with NO potential difference between both the sender and receiver locations. The UTP splitter can handle up to 5 v peak-to-peak ground noise between the two locations, but no more

**3. Shaking image or periodically blanking monitor**
Inherently, balanced signal transmission over twisted pair offers good immunity to EMI coupled noise from other external sources. However, a strong electromagnetic noise field can cause instability in the signal.

Usual sources are high power AC lines or data and/or control cables that run adjacent to and parallel with a substantial length of the CAT5 cable. To eliminate this, either place a distance between the CAT5 cables from the splitter and the interfering source, or use shielded twisted pair (STP) CAT5 cables.

**4. The PC does not recognize a Plug-and-Play monitor**
If the PC's Operating System is setup to detect a plug-and-play monitor (usually in Display Properties Advanced Settings), it may have trouble finding a monitor if no local monitor is hooked up to the splitter. Only the ID information of the local monitor is passed to the PC. If the PC does not produce an image due to this, either connect a monitor to the local VGA output port, or disable the plug-and-play monitor detection in the PC's operating system.

**5. Poor audio quality at the receiving end**

Only use powered speakers with the splitter and receivers. It is also good practice to set the audio level (volume) output of the PC about 1/2 to 2/3 from the maximum and use the volume knob of the speakers to adjust the volume to the desired level. A low volume signal output from the PC reduces the signal-to-noise (S/N) ratio, whereas too high output amplitude can cause saturation and clipping to occur.

## 4.2 Calling Hall Research Technologies

If you determine that your splitter is malfunctioning, do not attempt to repair the unit. Contact Hall Research Technologies Tech. Support at 714-641-6607. Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

## 4.3 Shipping and Packaging

If you need to transport or ship your Splitter: Package it carefully (we recommend that you use the original container), and before you ship the unit back to Hall Research Technologies for repair or return, contact us to get a Return Material Authorization (RMA) number.

# 5. Specifications

| | |
|---|---|
| **Supported Video Types** | VGA through UXGA, RGBS, or RGB<br>*Can also transmit Composite Video (CV), S-Video (Y/C), and Component Video ($Y,P_b,P_r$) on pins 1,2, and 3 of the HD15 VGA connector (adaptor cable may be needed)* |
| **Resolution & Refresh Rate** | Up to 1600 x 1280 non-interlaced at up to 85 Hz |
| **Bandwidth** | Video: DC to 250 MHz, Audio: 20 Hz to 10 KHz |
| **Video Level** | 0.7 volts peak-to-peak |
| **Audio Transmission** | Local output: Pass-Through Stereo, Remote: Mono |

| | |
|---|---|
| **Maximum Distance** | Up to 1000 ft. (305 meters) – See table 3.1 for details |
| **Connectors** | HD15 female for video input and output<br>3.5 mm Mini-Stereo for audio input and output<br>RJ45 for CAT5 A/V outputs |
| **Compliance** | CE; FCC Part 15 Subpart B Class A, IC Class |
| **Maximum Altitude** | 10,000 ft. (3048 m) |
| **Temperature Tolerance** | Operating: 32 to 122°F (0 to 50°C);<br>Storage: –40 to +185°F (–40 to +85°C) |
| **Humidity** | Up to 95% non-condensing |
| **Enclosure** | Steel |
| **MTBF** | 100,000 hours (calculated estimate) |
| **Power** | All units except UVA-24: from utility-power (mains) outlet, through included external power adapters.<br>Output Voltage: 6 DC Center-Positive.<br>Power supply current requirements: 300 ma minimum for UVA-2 and URA, 500 ma minimum for UVA-4 and UVA-8.<br>UVA-24: Directly from 100~220 VAC |
| **Size & Weight** | UVA-2 : 1.22"H x 4.86"W x 2.60"D - 1.8 lbs<br>UVA-4 : 1.22"H x 8.20"W x 3.00"D 2.4 lbs<br>UVA-8 : 1.32"H x 7.58"W x 3.88"D – 3.0 lbs<br>*(UVA-8 has 2 L-shaped mounting ears that protrude 0.88" beyond the main box on each side). 4 mounting holes are present on a rectangular pattern of 8.62" x 2.63"*<br>UVA-24 : 16.7" L x 9.58" W x 3.2" H *(with 19" x 3.44" front panel) – 6.5 lbs*<br>URA: 1.22"H x 4.16"W x 2.60"D – 1.6 lbs |

Products Designed and Made in the USA

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**1163 Warner Ave. Tustin, CA USA , Ph: (714)641-6607 , Fax -6698**